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Strengthening the sclera with a strip of fascia lata in progressive myopia

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The surgical methods of treating myopia may be divided into two groups:

(1) Removal of the clear lens (Fukala, 1890), operations on the cornea to reduce its refractive power (Sato, Akiyama, and Shibata, 1953), lamellar resection of the sclera, implantation of an intraocular lens (Choyce, 1964).

These operations decrease the degree of myopia but do not check its progress.

(2) Operations which disrupt the pathogenetic mechanism responsible for the progress of the myopia by supporting the posterior segment of the sclera with auto- or homo- transplants. Strips of tendon (Malbrán, 1954), of sclera (Borley and Snyder, 1958; Miller and Borley, 1964), or of fascia lata (Shevelev, 1930; Curtin, 1961) are used for this purpose and good results have been reported. There is no further stretching of the globe and visual acuity improves.

The reduction of myopia usually reported is probably due to the postoperative contraction of the transplant and sclera.

In our opinion the procedure of strengthening the sclera with fascia lata offers the best prognosis. Fascia tissue is not only more elastic than either sclera or tendon, easy to handle, and sufficiently strong (Curtin, 1960), but can also be taken from the patient himself.

The method of supporting the posterior sclera with a strip of fascia lata was worked out experimentally by Shevelev (1930). Later Curtin (1960, 1961) described a similar operation which he had performed successfully on seven subjects with progressive myopia. Eroshevsky (1968) has reported favourably on the results of Curtin's operation which he has performed on twenty eyes.

We have simplified and improved the Shevelev-Curtin operation. A description of the technique and a report on the results in 84 eyes of 67 patients form the subject of the present communication.

Surgical technique

INSTRUMENTS

Along with the conventional instruments we use a special fascial stripper to dissect the strip of fascia and a hooked carrier to pass the fascia behind the globe (Fig. 1, opposite).

The stripper consists of two tubes, one inside the other. The outer tube (170 mm. long, outer diameter 8 mm., inner diameter 6 mm.) has a handle at one end, and the other end is tapered to a cone. The inner tube is the same length as the outer one, and its diameter is such that it moves freely inside it.

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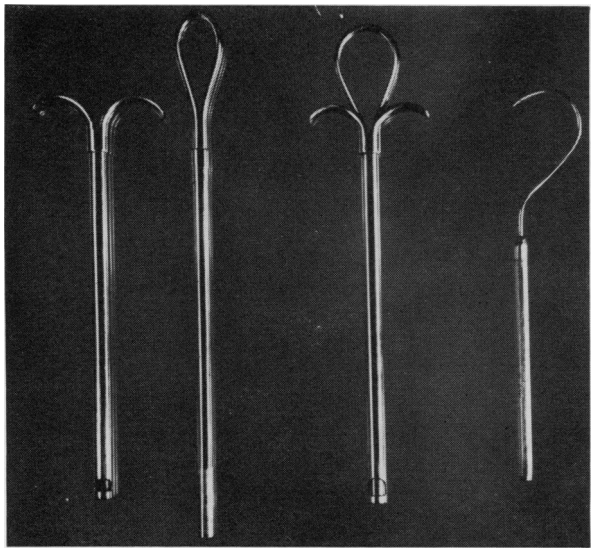

FIG. 1 *Fascial stripper and hook. Outer tube; inner tube; instrument assembled; Curtin's fascial hook*

The hook used to pass the strip of fascia behind the globe consists of a handle, an eye-shaped curve and a small eye at the end.

GRAFT

Under local anaesthesia with 0·25 per cent. solution of procaine, a 30-mm. incision of the skin is made along the dividing line between the upper and the middle third of the outer surface of the thigh. The wound is pulled apart with the hooks. Two parallel incisions of the fascia lata are made 6 mm. apart, and joined at the top by a third one. The resultant strip is passed through the lower end of the stripper and out through the aperture in the side of the outer tube, where it is gripped with a clamp. After that the stripper is moved subcutaneously towards the knee to the required length (100–120 mm.). The inner tube is inserted into the outer one and turned slightly to cut off the strip. The stripper and fascia are removed and the wound sutured.

The strip of fascia is laid on moist gauze and cut longitudinally to make a Y-shaped transplant with two narrow arms and one broad one (Fig. 2).

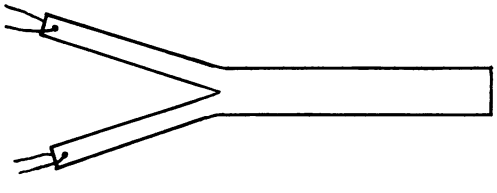

FIG. 2 *Y-shaped graft*

OPERATION

After a lateral canthotomy, a conjunctival-tenon incision about 10 mm. long is made about 7 mm. temporal to the limbus. The lateral rectus muscle is taken up in two catgut ligatures and is cut off. A traction suture is put in across the stump of the muscle tendon.

Two conjunctival-tenon incisions are made 6 mm. from the limbus in the supero-nasal and infero-nasal quadrants (Fig. 3, overleaf).

The Curtin hook is passed behind the globe from the supero-nasal incision until its end comes out through the lateral incision. This procedure is made easier by turning the eye with the help of the traction suture (Fig. 4).

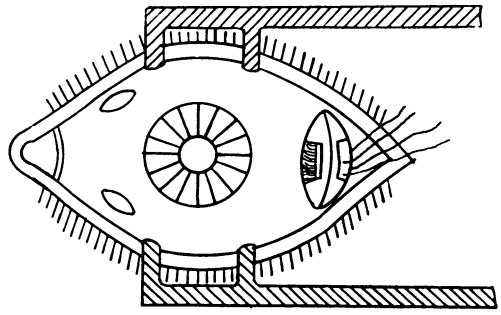

FIG. 3 *Position of conjunctival-tenon incision on the globe*

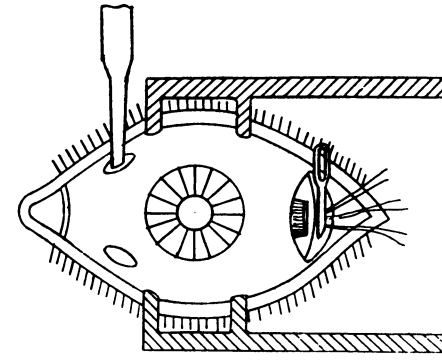

FIG. 4 *Fascial hook passed into the supero-nasal incision and out through the temporal incision*

One of the narrow transplant arms is threaded through the eye, and pulled back behind the globe. This manipulation is repeated through the infero-nasal incision and the other narrow arm is passed through. The two arms are drawn until the central part of the graft is felt to reach the optic nerve. The third broad arm now runs along the horizontal meridian at the temporal side of the eyeball (Fig. 5).

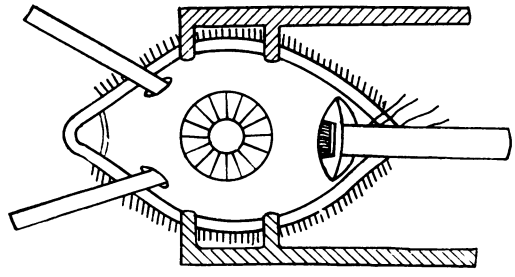

FIG. 5 *Position of the graft before suturing the ends to the sclera*

The position of the graft at the front and back of the globe is shown in Fig. 6.

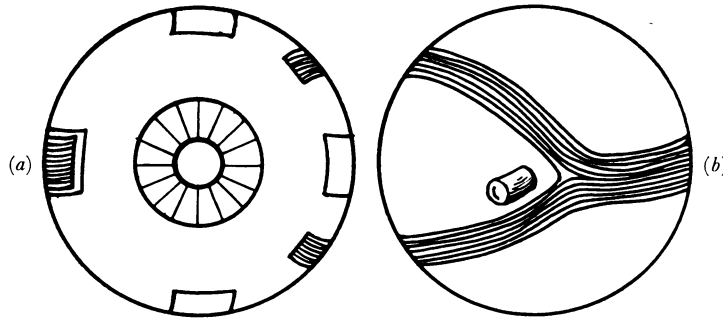

FIG. 6 *Position of transplant after operation*
(*a*) Anterior
(*b*) Posterior

Each arm is fixed to the sclera by means of two silk sutures 7 to 8 mm. from the limbus, and the superfluous ends are cut off. The lateral rectus is re-sutured to the globe, the conjunctival incisions are closed with silk (3–0), and the retina is examined with the ophthalmoscope to make sure that the blood circulation is not impaired.

We originally used an X-shaped graft according to the method of Shevelev (1930) and Curtin (1960, 1961), but in cases of high myopia with an egg-shaped eyeball it is difficult to keep the graft in the correct position. When the arms are drawn tight they tend to slip from the oblique to the vertical meridian so that the centre comes away from the posterior pole. This not only reduces the effect of the operation but may block the vortex veins. The Y-shaped graft will support the sclera just where it is most stretched along the horizontal meridian.

Results

84 operations were performed in 67 patients, both eyes being operated upon in seventeen patients. The age of the patients varied from 8 to 52 years, and the myopia from 10 to 39 D sph. (mean 14 D). 23 eyes were astigmatic (more than 1 D cyl.). Sixteen patients (23 eyes) had degenerative changes of the choroid and retina. One female patient showed advanced pigmentary degeneration of the retina. The myopia was progressive in every case.

Complications

There were no operative complications. After the operation all the patients had tenonitis, manifested by oedema of the conjunctiva and eyelids, mild proptosis, and some discomfort on moving the eye. These phenomena were less marked if a tight bandage had been used postoperatively. The tenonitis disappeared in 3 to 4 days.

One female patient (myopia 24 D) developed retinal detachment on the 17th day after the operation, which may have been due to physical strain (the patient was waxing floors). One year after the operation the visual acuity was 0·05 above the initial figure and the myopia had decreased by 5 D.*

Visual acuity

The immediate postoperative results were as follows. An improvement in visual acuity and myopia was observed in 82 out of 84 eyes. Before the operation the visual acuity varied from 0·005 to 0·1 (0·01 to 0·5 with correction) and after the operation from 0·02 to 0·3 (0·06 to 1 with correction). The average improvement was 0·03 to 0·14 (0·22 to 0·35 with correction).

The power of corrective glasses decreased by 1 to 8 D (average 3·6). Sciascopic myopia decreased by 1 to 8 D (average 3·6 D).

Follow-up

Twenty eyes have been under observation for from 3 to 12 months, 48 from 12 to 24 months, and sixteen from 24 to 37 months. In the 64 eyes which have been followed up for more than a year only slight changes have been noted. The visual acuity rose in fourteen more eyes, did not change in 45, and decreased in five. The degree of myopia increased slightly in four eyes, but did not reach the preoperative level.

The required power of corrective glasses continued to decrease in 31 and remained unchanged in 33 eyes. The degree of myopia has now decreased by an average 0·47 D compared with the immediate results.

The corrected visual acuity increased in eighteen eyes, did not change in 44, and decreased (by 0·02–0·04) in two subjects with degenerative changes of the central retina and choroid. The corrected visual acuity has now risen by an average of 0·04 compared with the immediate results.

There has been no material change in the twenty eyes observed for up to one year (3 to 12 months).

*When X-shaped grafts were used three patients had more serious complications (Nesterov and Libenson, 1967).

Illustrative case

A woman aged 36 years had bilateral progressive myopia. The visual acuity was 0·06 in the right eye (0·2 with −13 D sph.) and 0·01 in the left eye (0·05 with −14 D sph.). Numerous atrophic chorio-retinal foci were present in the macular and paramacular regions of the left eye.

The operation was first performed on the worse (left) eye, and there was moderate postoperative tenonitis for 5 days. The visual acuity improved to 0·06 (0·2 with −11 D) 3 weeks after the operation. One year after the operation the visual acuity was 0·06 (0·25 with −10 D); 33 months after surgery there were no further changes in either vision or refraction. The right eye was then operated upon. There were no complications either during the operation or postoperatively, and after 3 weeks the visual acuity improved to 0·3, but the degree of sciascopic myopia was unchanged at 13 D. In the course of 28 months the visual acuity improved to 0·2 (0·4 with −9 D).

Summary

A method of strengthening the sclera with fascia lata in cases of progressive high myopia is described. The advantages are the simplified technique, the lessened risk of blocking the vortex veins, and the strengthening of the sclera along the horizontal meridian of the eye.

The findings are reported in 84 operations on 67 patients with myopia ranging from 10 to 39 D. There were no operative complications, and the visual acuity improved in all but two cases. After prolonged follow-up no increase in the myopia has been observed.

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